CLAIMS:

1. A microwave antenna for transmitting and/or receiving electromagnetic waves of at least one predefined frequency and a predefined polarization, the antenna comprising a support with upper and lower faces; at least one pair of substantially identical upper and lower radiating elements disposed on said upper and lower faces; in each pair of said radiating element in the upper face and the corresponding radiating element in the lower face, the phase center of the lower radiating element substantially coincides with the phase center of the upper radiating element.

2. An antenna according to Claim 1 wherein said support is conformal.

3. An antenna according to Claim 1 wherein said support is substantially planar.

4. An antenna according to Claim 1 wherein said predefined polarization is a circular polarization, and wherein each of said radiating elements is capable of radiating electromagnetic waves of a circular polarization.

5. An antenna according to Claim 4 wherein said radiating elements comprising bend-shaped elements.

6. An antenna according to Claim 4 wherein said bend-shape is an L-shape.

7. An antenna according to Claim 6 wherein said L-shape having first and second branches and a feed point located on said second branch such that the electric current generated in the second branch is phase delayed in 90° with respect to the electric current generated in the first branch.

8. An antenna according to Claim 7 wherein said L-shape having an X branch and an orthogonal Y branch, and wherein:

- the length A of the X branch and the length B of the Y branch are substantially identical and depend on said predefined frequency according to the relation: A, B = $K_1 \lambda_0$, K_1 is in the range of 0.3 to 0.35;

- the widths C of the X and Y branches depend on said predefined frequency according to the relation: $C = K_2 \lambda_0$, K_2 is in the range of 0.10 to 0.20;
- the length D between the X branch of said upper radiating element and the X branch of said lower radiating element depend on said predefined frequency according to the relation: $D = K_3 \lambda_0$, K_3 is in the range of 0.3 to 0.6;
- the length E between the Y branch of said upper radiating element and the Y branch of said lower radiating element depend on said predefined frequency according to the relation: $E = K_4 \lambda_0$, K_4 is in the range of 0.3 to 0.6;

wherein λ_0 is the wavelength of said predefined frequency in air.

9. An antenna according to Claim 1 wherein said predefined polarization is a linear polarization.

10. An antenna according to Claim 9 wherein said radiating elements comprising radiating elements having first and second branches arranged in an acute angle with respect to each other.

11. An antenna according to Claim 10 wherein:

- said upper and lower radiating elements are symmetrically arranged such that the first branches of the upper and lower elements are in parallel; and
- the electrical length of said first branch is $0.5\lambda_0$, wherein λ_0 is the wavelength of said predefined frequency in air.

12. An antenna according to Claim 1 wherein said pair of substantially identical upper and lower radiating elements disposed on said upper and lower faces yields gain increase in the range of 1dB-3dB.

13. An antenna for transmitting and/or receiving electromagnetic waves of at least one predefined frequency and a predefined polarization, the antenna comprising a multi-layered substrate structure having a dielectric substrate with upper and lower faces; at least one pair of substantially identical upper and lower

radiating elements disposed on said upper and lower faces of the dielectric substrate; each radiating element transmitting and/or receiving electromagnetic waves with a phase center located at a predefined position; each radiating element comprising a radiating element and a transmission line, the geometrical dimensions of which depend on said predefined frequency; in each pair of said radiating element in the upper face and the corresponding radiating element in the lower face:

- the transmission lines of the upper and lower elements overlay each other;
- the radiating elements of the upper and lower elements are located oppositely to each other with respect to a plane perpendicular to the plane of the dielectric substrate, such that the phase center of the lower radiating element substantially coincides with the phase center of the upper radiating element.

14. An antenna according to Claim 13 wherein said multi-layered substrate structure is conformal .

15. An antenna according to Claim 1 wherein said multi-layered substrate structure is substantially planar.

16. An antenna according to Claim 13 wherein said predefined polarization is a circular polarization, and wherein each of said radiating elements is capable of radiating electromagnetic waves of a circular polarization.

17. An antenna according to Claim 16 wherein said radiating elements comprising radiating elements having a substantial L-shape.

18. An antenna according to Claim 16 wherein said radiating elements comprising radiating elements having an L-shape.

19. An antenna according to Claim 18 wherein said L-shape having first and second branches and a feed point located on said second branch such that the electric current generated in the second branch is phase delayed at 90° with respect to the electric current generated in the first branch.

20. An antenna according to Claim 13 wherein said predefined polarization is a linear polarization.

21. An antenna according to Claim 20 wherein said radiating elements comprising radiating elements having first and second branches arranged in an acute angle with respect to each other.

22. An antenna according to Claim 21 wherein:

- said upper and lower radiating elements are symmetrically arranged such that the first branches of the upper and lower elements are in parallel; and
- the electrical length of said first branch is $0.5\lambda_0$, wherein λ_0 is the wavelength of said predefined frequency in air.

23. An antenna according to Claim 13 wherein said pair of substantially identical upper and lower radiating elements disposed on said upper and lower faces yields gain increase in the range of 1dB-3dB.

24. A method for providing a planar antenna for transmitting and/or receiving electromagnetic waves of at least one predefined frequency and a predefined polarization, the antenna having a dielectric substrate with upper and lower faces; at least one pair of substantially identical upper and lower radiating elements disposed on said upper and lower faces of the dielectric substrate; said radiating elements comprising radiating elements having first and second branches the method comprising:

- determining the planar arrangement and the geometrical dimensions of said first and second branches in accordance with said predefined polarization and said at least one predefined frequency;
- associating each of the radiating elements in the upper face with a corresponding radiating element in the lower face, such that the phase center of the lower radiating element substantially coincides with the phase center of the upper radiating element.

25. A method according to Claim 24 wherein said predefined polarization is a circular polarization and wherein each of said radiating elements is capable of radiating electromagnetic waves of a circular polarization.

26. A method according to Claim 25 wherein said radiating elements comprise radiating elements having a bend-shape.

27. A method according to Claim 26 wherein said bend-shape is an L-shape.

28. A method according to Claim 27 wherein said L-shape having first and second branches and a feed point located on said second branch such that the electric current generated in the second branch is phase delayed at 90° with respect to the electric current generated in the first branch.

29. A method according to Claim 27 wherein said L-shape having an X branch and an orthogonal Y branch, and wherein:

- the length A of the X branch and the length B of the Y branch are substantially identical and depend on said predefined frequency according to the relation: A, B = $K_1 \lambda_0$, K_1 is in the range of 0.3 to 0.35;
- the widths C of the X and Y branches depend on said predefined frequency according to the relation: C = $K_2 \lambda_0$, K_2 is in the range of 0.10 to 0.20;
- the length D between the X branch of said upper radiating element and the X branch of said lower radiating element depend on said predefined frequency according to the relation: D = $K_3 \lambda_0$, K_3 is in the range of 0.3 to 0.6;
- the length E between the Y branch of said upper radiating element and the Y branch of said lower radiating element depend on said predefined frequency according to the relation: E = $K_4 \lambda_0$, K_4 is in the range of 0.3 to 0.6;

wherein λ_0 is the wavelength of said predefined frequency in air.

30. A method according to Claim 24 wherein said predefined polarization is a linear polarization.

31. A method according to Claim 30 wherein said radiating elements comprise radiating elements having first and second branches arranged in an acute angle with respect to each other.

32. A method according to Claim 31 wherein:

- said upper and lower radiating elements are symmetrically arranged such that the first branches of the upper and lower elements are in parallel; and
- the electrical length of said first branch is $0.5\lambda_0$, wherein λ_0 is the wavelength of said predefined frequency in air.